Space Weather Forecast

Issued on Tuesday, 16 May 2023 at 13:11 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Slight chance of Moderate X-ray flares and R1/R2 radio blackouts, perhaps rising after midweek.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low over the last 24 hours, with X-ray activity confined to isolated low-end Common-class flares.

There are currently six sunspot regions on the Sun. A sunspot region near the middle of the Sun remains the largest and most complex group, and is the only one on the facing side that saw a significant growth trend, with its trailing group of spots increasing in number, size and spread. This has not as yet been capped by significant flare activity.

Prior to the start of this reporting period, a 'filament' (arc of plasma) was observed to leave the northwest around 15/1000UTC. This is undergoing assessment. Also of note on imagery was a large Coronal Mass Ejection (CME) seen leaving the southeast during the UTC afternoon of 15 May. This may be linked to activity beyond the eastern horizon, and has been analysed as a miss behind and below the track of the Earth's orbit, despite a slightly front-sided solution from modelling. No confirmed Earth-directed CMEs were therefore in evidence.

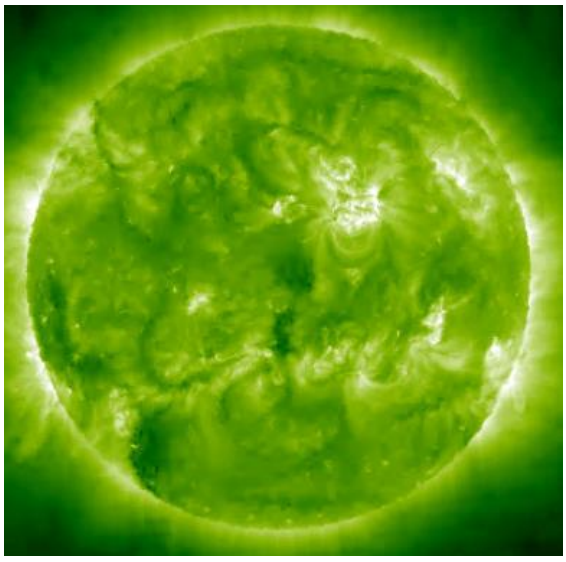

Figure 1: False colour extreme UV imagery from 16/1100UTC, showing around 10 degrees more of the upcoming eastern solar horizon when compared with an Earth-based line of sight (LHS of image). One, or possibly two bright flux regions (usually coincident with sunspots) on this satellite's eastern horizon may hint at a tentative increase in activity is to be expected at Earth later this UTC week.

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Solar Wind / Geomagnetic Activity: The solar wind speed was slightly elevated through the period, with an erratic trend. The mechanism for this is not certain, but is perhaps linked to a high solar latitude 'coronal hole' fast wind, i.e. one that does not have a particularly direct route to affect Earth - instead largely passing over the track of the Earth's orbit. Both the number of particles in the solar wind and their associated magnetic fields were at normal background levels.

The net effect of the above solar wind measures was for mainly quiet geomagnetic activity, comfortably below Minor Geomagnetic Storm G1 throughout.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries an initial slight chance of becoming Moderate, perhaps increasing to a chance after midweek UTC with the expected arrival of a non-Earth directed CME-producing sunspot region over the southeastern solar horizon, with no significant regions departing.

Solar Wind / Geomagnetic Activity: No CMEs now feature in the four-day forecast, although the 15/1000UTC northwestern quadrant filament is undergoing assessment.

Beyond the possible current marginal influence of the high latitude coronal hole, the only coronal hole fast wind due in the four days is minor and mooted for Friday 19 May. Although this is the peak risk of G1 for the period as a whole, it only offers a slight chance of Minor Geomagnetic Storm G1, with quiet conditions predominant until then.

Energetic Particles / Solar Radiation: No solar radiation storms are expected.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	1	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	20	30	30	30
Very Active	R3 to R5 X	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	2	1	2	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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